

课程详述

COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	课程名称 Course Title	软体机器人 Soft Robotics				
2.	授课院系 Originating Department	机械与能源工程 Department of Mechanical and Energy Engineering				
3.	课程编号 Course Code	ME435				
4.	课程学分 Credit Value	3				
5.	课程类别 Course Type	专业选修课 Major Elective Courses				
6.	授课学期 Semester	秋季 Fall				
7.	授课语言 Teaching Language	英文 English				
8.	授课教师、所属学系、联系方式（如属团队授课，请列明其他授课教师） Instructor(s), Affiliation & Contact (For team teaching, please list all instructors)	王峥 教授，机械与能源工程系， wangz@sustech.edu.cn Prof Wang Zheng, Dept. Mechanical and Energy Engineering, wangz@sustech.edu.cn				
9.	实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact	汤凯栾（Tang Kailuan）， tangkl@mail.sustech.edu.cn				
10.	选课人数限额(可不填) Maximum Enrolment (Optional)	20				
11.	授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other (Please specify)	总学时 Total
	学时数 Credit Hours	48				48

12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	ME303 机械设计基础 Introduction to Mechanical Design
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite	
14. 其它要求修读本课程的学系 Cross-listing Dept.	

教学大纲及教学日历 SYLLABUS

15. 教学目标 **Course Objectives**

本课程通过系统性的介绍软体机器人的原理，材料，设计，建模，和控制等多方面基础知识，帮助学生建立有关软体机器人的知识结构；通过前沿性成果的介绍，帮助学生认知和掌握机器人领域最前沿的新进展；通过实际设计、制作、和应用软体机器人系统，帮助学生获得第一手的实操经验，体会软体机器人的独特特性，并将所学知识进行直接应用。本课程由三个部分相结合构成，第一部分着重于软体机器人的系统性知识介绍，第二部分着重于软体机器人前沿进展的展示，第三部分着重于软体机器人的实际设计和应用。

This course systematically introduces the principles, materials, design, modeling, and control of soft robotics, helping students establish structured knowledge on soft robotics. By introducing cutting edge progresses, students will appreciate the frontier results in robotics. By actually design, fabricate, and implement real world soft robot systems, students will obtain first hand experiences on the unique characteristics of soft robots, and apply learned knowledge into reality. This course will consist of three components: the first focusing on the systematic introduction of soft robotic knowledge; the second focusing on showcasing the frontier progresses; the third focusing on the design and implementation of soft robots.

16. 预达学习成果 **Learning Outcomes**

1. 了解和掌握软体机器人的基本知识和原理，并认识其优势与局限性。
 2. 掌握软体机器人的前沿进展，并能够有针对性的进行讨论。
 3. 熟悉和掌握软体机器人的设计和分析原理，并能提出具有独立性的设计。
 4. 掌握软体机器人的制造和控制原理，并能够完成软体机器人的实际应用。
1. Understand the basic knowledge and principles of soft robots, and know the advantages and limitations.
 2. Appreciate the frontier progresses of soft robotics, and form specific arguments.
 3. Familiar with the design principles and analytics of soft robots, propose independent designs.
 4. Obtain knowledge on the fabrication and control principles of soft robots, complete a soft robotic implementation.

17. 课程内容及教学日历（如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）
Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)

Topic	Week	Total Hours	Hours	Contents
1. Introduction to Soft Robotics	2	6	2	Introduction to Soft Robots
			2	Definition of soft robots
			2	Soft robotic examples
2. Principles of Soft Robots	2	6	1	The working principles of soft robots
			1	Unique characteristics
			2	Different approaches to soft robots
			2	Soft robotic modelling
3. Design of Soft Robots	2	6	1	Design of soft robotic actuator
			1	Design of soft robotic sensor
			1	Design of soft robotic system
			3	Soft robotic design examples
4. Frontiers of Soft Robots	3	9	3	New progresses in soft robotics research
			2	Cutting edge soft robotic systems
			2	Novel and frontier soft robotic designs
			2	Limitations of soft robots
5. Materials and Fabrication of Soft Robots	2	6	2	Soft materials in soft robotics
			2	Fabrication approaches
			2	Case studies
6. Control of Soft Robots	3	9	2	Fluid control fundamentals
			2	High precision pneumatic control
			2	System integration
			3	Soft robotic control practises
7. Group Project Competition	2	6	3	Group design project
			3	Project competition

18. 教材及其它参考资料 Textbook and Supplementary Readings

www.softroboticstoolkit.com

课程评估 ASSESSMENT

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance				
课堂表现 Class Performance				
小测验 Quiz				
课程项目 Projects		60		
平时作业 Assignments		40		
期中考试 Mid-Term Test				
期末考试 Final Exam				
期末报告 Final Presentation				
其它（可根据需要 改写以上评估方式） Others (The above may be modified as necessary)				

20. 记分方式 GRADING SYSTEM

- A. 十三级等级制 Letter Grading
 B. 二级记分制（通过/不通过） Pass/Fail Grading

课程审批 REVIEW AND APPROVAL

21. 本课程设置已经过以下责任人/委员会审议通过
This Course has been approved by the following person or committee of authority

机械与能源工程系教学委员会